Gage, Bill (EEA)

From: Thea Paneth [tpaneth@gmail.com]
Sent: Tuesday, February 05, 2013 12:35 PM
To: Sullivan, Rick (EEA); maeve.vallely-bartlett@state.ma.us
Cc: Gage, Bill (EEA)
Subject: Public Comment - NEIDL
Attachments: Sullivan-Letter-MEPA.pdf

Attached please find a letter from Arlington United for Justice with Peace regarding our concerns at the placement of a BSL3 and 4 laboratory in the middle of Boston.

Thank you for your attention to our concerns.

Thea Paneth

Arlington United for Justice with Peace

February 5, 2013

Secretary Richard Sullivan
Executive Office of Energy and Environmental Affairs
Attn: MEPA Office
100 Cambridge Street, Suite 900
Boston, MA 02114
Rick.sullivan@state.ma.us

RE: National Emerging Infections Diseases Laboratories (NEIDL)

Dear Secretary Sullivan:

We write to express our profound concerns at the siting of a BSL3 and BSL4 laboratory that carries out highly dangerous research in the middle of Boston. Our concerns were supported by the Arlington Board of Selectmen, which passed a resolution in opposition to the siting of this laboratory in 2007.

Level 4 bioresearch is also a means to create forms of biological weapons (such as aerosolized forms of *Bacillus anthracis*). Conducting such research risks setting off a bio-warfare arms race, because the U.S. is not adhering to the Biological Weapons Convention.[1]

We think that it is unwise, even foolhardy, to approve a Level 4 facility in a densely populated area where 25,000 people live within one mile. We ask that you not approve BSL4 research at the 620 Albany Street facility.

During the past ten years of this conflict, we have become more concerned, rather than less concerned about this laboratory. It is very clear that the democratic institutions and procedures for public participation and governmental as well as university accountability have been lacking since the beginning of the conflict.

For example, we witnessed a "public hearing" where the public could speak out about their concerns, but NIH representatives in charge of the Supplemental Risk Assessment did not have to answer any questions. We have seen first-hand, the dismissive

condescension expressed by some public officials and Boston University representatives towards community concerns.

As we all know, the Boston Public Health Commission (BPHC), which bears the responsibility for regulating the NEIDL, does not have the budget, expertise or manpower to oversee the safe operation for a BSL4 laboratory. We question whether oversight of such a complex laboratory really falls under the purview of a city agency that is supposed to protect public health.

Considering the well-known scandals that resulted in illnesses and deaths, due to poor *state* oversight of New England Compounding pharmacy we must seriously question the delegation of oversight responsibility of a BSL4 facility to the BPHC.

In addition, as we know from decades of failures to protect people's health and safety that even federal government agencies – for example the Occupational Safety and Health Administration (OSHA) do not have adequate resources to safely oversee millions of companies that use toxic chemicals. It would take OSHA 70 years to inspect every company one time to protect worker safety and health; and Environmental Protection Agency inspections of confirmed toxic waste sites happen at a rate of less than once every fifty years.[2]

These BSL3 and 4 laboratories have been proliferating with little or no coordination over the past ten years. There has not been a fact-based assessment of biological threats, only an open-ended flood of research funds that do not address real health concerns.[3] In addition, BSL4 research could yield much more dangerous pathogens to be used as a weapon, something our group deeply opposes.

We advocate that biomedical research be demilitarized. A public health model for creating and funding research projects should be put in place, especially in facilities that are sited in the middle of a city.

Responsibility for protecting the right to health and safety of the people of Massachusetts rests with you.

Sincerely,

Barbara Boltz
William Fletcher
Noble Larson
Susan Lees
Ann Mathes, R.N.
Chris Nauman, M.D.
Thea Paneth
Emily Snyder
For Arlington United for Justice with Peace

cc: William Gage
Bill.gage@state.ma.us

---

[1] Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on their Destruction, Signed at London, Moscow and Washington on April 10, 1072. Entered into force March 25, 1975.

[2] Fighting Toxics, Ed. G. Cohen and J. O'Connor, Island Press, 1990, p21.

[3] High-Containment Laboratories, National Strategy for Oversight is Needed, United States Government Accountability Office, Report to Congressional Requesters, September 2009.

Gage, Bill (EEA)

From: Valley Bartlett, Maeve (EEA)
Sent: Thursday, February 14, 2013 11:09 AM
To: Gage, Bill (EEA)
Subject: FW: NEIDL
Attachments: NEIDL letter to Dir of MEPA

From: Brenda Steinberg [mailto:brendasteinberg@gmail.com]
Sent: Saturday, February 09, 2013 1:08 PM
To: Valley Bartlett, Maeve (EEA)
Cc: Sullivan, Rick (EEA)
Subject: NEIDL

Dear Director Vallely-Bartlett:
Please be so kind as to read my attached letter regarding the National Emerging Infections Diseases Laboratories.
Sincerely yours,
Brenda M Steinberg,PHD

February 9, 2013
Director Maeve Vallely-Bartlett
MEPA
Maeve.vallely.bartlett@state.ma.us

RE: National Emerging Infections Diseases Laboratories (NEIDL)

Dear Director Vallely-Bartlett:

I am writing because of my serious concern over the potential presence of a BSL4 research facility in Boston. It is my understanding that research undertaken at level 4 laboratories involve the use of virulent pathogens and the occasional design of biological weapons.

I have attended several community meetings but have left each one with the fear that dangerous pathogens cannot be sufficiently contained to make it reasonable for such a laboratory to be placed in an urban community. A number of scientists with expertise in pathogen research and laboratory safety spoke at those meetings but I did not really have the feeling that representatives from Boston University or NIH were truly listening to what they had to say. I did not hear any responses that left me with confidence that the presence of the lab would definitely be safe for residents. I feel that BU and NIH are having meetings perforce but really hope to just wait it out until the public gives up.

One of the issues raised but not properly responded to by BU or NIH is the issue of terrorism. I have heard that the Defense Science Board, an advisory board to the Secretary of Defense, published a report stating that actions with evil intent present a "real" threat at labs like the one planned. Yet, BU and NIH are behaving as though this is a trivial concern.

Another issue brought to my attention by friends in Arlington is that a lab involved with biological weapons is not in conformance with the international "Biological Weapons Convention.

I believe that the planned BSL4 research is dangerous to the community and in potential violation of the Biological Weapons Convention and I ask that you not approve it.

Sincerely yours,
Brenda M Steinberg

Gage, Bill (EEA)

From: m pellet [mpellet@hotmail.com]
Sent: Thursday, February 21, 2013 8:12 PM
To: Valley Bartlett, Maeve (EEA); Sullivan, Rick (EEA); Gage, Bill (EEA)
Cc: mmakarious@andersonkreiger.com
Subject: Comments on the MEPA review for the NEIDL
Attachments: 100407 GAO RhodesTestimony.pdf; sept 2009 GAO report BSL oversight needed.pdf; alternative vision full proposal final lk082610.doc

Dear Secretary Sullivan, Director Vallely-Bartlett and Mr. Gage,
My name is Marc Pelletier, a resident of Boston and molecular biologist with 25 years+ experience in medical research in immunology, infectious disease and cancer. I am very familiar with the NEIDL proposal, having read documents and attended public meetings about the project since it emerged in 2003. My specific comments concerning the Risk Assessment are below, followed by my follow up comments to the comments that NIH and TetraTech had made to my initial comments on the 90% Risk Assessment and were included in the final Risk Assessment. However, before addressing the specific issues with the latest version of the Risk Assessment, I have listed a broader set of issues that need to be taken into account when deciding on the MEPA application.

Sincerely,
Marc Pelletier
8 Glade Ave.
Boston, MA 02130

The risk assessment process is rife with conflict of interest.
This risk assessment of this NIH lab was done by contractors paid by NIH. Independent review by the National Research Council of the previous risk assessment done by TetraTech was highly critical. As the final report was compiled in spring 2012, voices on the NRC were muted and there was no ringing endorsement of the current Risk Assessment.
A credible risk analysis, free of conflict of interest, needs to be organized by an agency outside of NIH. I have previously suggested the General Accounting Office, which has already compiled two reports on the status of BSL-3 & 4 labs in the U.S. The GAO still remains a much better option than having NIH run a risk assessment for their own project.

Key portions of the Risk Assessment were not revealed to the public
NIH and TetraTech have informed us that their full assessment is contained in a separate and classified threat assessment document. Considering that it has been members of the community, outside of the influence of BU and NIH, who have consistently pointed out the flaws in all of the previously released and rejected risk assessments, cloaking portions of the current report in secrecy is an effective way to shut out dissenting views. If the public is to be able to trust the risk assessment, they need to see it. In light of the poor record that NIH has had on developing risk assessments for the NEIDL, people are not willing to blindly trust BU and NIH. This is a truly Orwellian process where only BU and NIH are allowed to see the risk assessment that they were instructed to prepare for public comment and evaluation.
For a critique about the "buddy system" that BUMC and NIH have repeatedly proposed for mitigation of malevolent actions and is likely contained in their classified portion of the RA, see points 33.1-33.4 on page 5 (below).

Lack of oversight

Reviews by the General Accounting Office (GAO) in 2007 and 2009 (see attached) raised red flags over the complete lack of oversight in the national BSL-3 and BSL-4 lab system. There is no federal or state oversight of the NEIDL. The Boston Public Health Commission is responsible for overseeing the lab. After extensive discussions with members of the BPHC, including w/ Dir. Ferrer and members of her staff, it is clear to me that the BPHC does not have the staff or experience to understand the work that the will be done in the lab. BUMC has stated that Dr. John Tonkiss, Associate Director of High Containment Security, will be responsible for the 'high containment' security. However, he also lacks any relevant experience in molecular biology or infectious disease. As stated to the GAO by the FBI, they will have an increasingly difficult task in tracking down bioterrorism culprits with the list of those with access on the increase.

Weaponization of pathogens is allowed in Boston by the BPHC

In 2006, the BPHC brought out new regulations for the biological research laboratories in Boston. One of the most striking additions to the regulations was the explicit allowance of weaponization of biological agents for 'peaceful purposes.'

BPHC regulations on biological research issued in 2006:
SECTION 4.00
PROHIBITIONS – WEAPONIZATION AND CLASSIFIED RESEARCH
Section 4.01 Weaponization
Any research that has the potential to enable the use of a High Risk Agent to serve in anyway as a principle component of a biological weapon, or significantly aid in the construction of a biological weapon or any research that has the potential to increase a High Risk Agent's pathogenicity, reduce a High Risk Agent's resistance to treatments by antibiotic, anti-viral or other anti-microbial agent, alter the High Risk Agents' vector of transmission, that is conducted for no prophylactic, protective, treatment or other peaceful purposes, is forbidden in the City of Boston.

Conjuring a 'peaceful purpose' for any research project is trivial. It is troubling that this amendment to the regulations was made as the NEIDL was being approved.
Since weaponized pathogens will likely be created in the NEIDL, any 'worst case scenario' modeling would need to include these agents. However, TetraTech did not include weaponized agents and therefore did not conduct a true 'worst case' assessment.

Vaccines against Ebola and Marburg have already been developed.

Using the tools of molecular biology as well as a much greater understanding of immunology, scientists have developed a DNA vaccine against Ebola that was found to be effective in Phase 1 clinical trials (in humans)[1]. Two other vaccines using different viral expression technologies have been shown to be effective in monkeys, protecting them from lethal doses of Ebola and Marburg viruses [2,3]. Virus-like particles, another novel vaccine technology, has provided 100% protection against Marburg and Ebola in rodents and is reported to show great promise in non-human primates as well[4]. There has also been success reported with an HIV vaccine candidate, that uses another novel technology (TLR targeted antigens)[5,6]. This should be easily transferable to combat Marburg and Ebola. Another new technology, RNA interference, nature's own prehistoric anti-viral system, is likely to provide another method for anti-viral therapy. All of these methods allow one to develop and test new therapies without the need for the hazardous biological agent. Only after extensive testing do researchers then send their totally harmless vaccine candidate to one of the existing BSL-4 labs for testing in monkeys. This currently functioning system avoids the need for proliferating the labs and hands that possess the actual bioterrorism agents.

1) "A DNA Vaccine for Ebola Virus Is Safe and Immunogenic in a Phase 1 Clinical Trial," Martin et al, *Clin. & Vacc. Imm.*, Nov. 2006, pp. 1267-1277

2) "Postexposure protection against Marburg haemorrhagic fever with recombinant vesicular stomatitis virus vectors in non-human primates: an efficacy assessment," Daddario-DiCaprioetal, *Lancet*, v. 367, Apr. 2006, pp. 1399-1404

3) "Immune Protection of Nonhuman Primates against Ebola Virus with Single Low-Dose Adenovirus Vectors Encoding Modified GPs," Sullivan et al, *PLOS Medicine*, June 2006, v. 3

4) "Filovirus-like particles as vaccines and discovery tools," Warfield et al, *Expert Rev. Vaccines*, 2005, vol. 4, pp. 429-440

5) "Toll-like receptor agonists influence the magnitude and quality of memory T cell responses after prime-boost immunization in nonhuman primates," Wille-Reece et al, *J Exp Med.*, May 2006, pp. 1249-1258

6) "HIV Gag protein conjugated to a Toll-like receptor 7/8 agonist improves the magnitude and quality of Th1 and CD8+ T cell responses in nonhuman primates," Wille-Reece et al , *Proc Natl Acad Sci U S A.*, Oct. 2005, pp. 15190-15194

Public health would be better served focusing the lab on diseases prevalent and emerging in the community

Attached is an in-depth analysis on whether another BSL-4 lab is needed and a proposal to focus the lab on diseases such as MRSA and other emerging strains that are claiming lives in the community.

Open community participation in their Community Liaison Committee was squelched

As part of their community outreach that was suggested by the court, BUMC selected a group of people from the community to serve on their Community Liaison Committee (CLC). They initially organized a series of open meetings near the Biosquare site. However, these open meetings were stopped after the second one, likely due to the overwhelming number of questions brought by skeptical neighbors.

BUMC has sought individuals to sit on their CLC several times since its inception. I have applied several times and consider myself a good candidate, with technical knowledge and interest in the research and residing in Boston, less than 2 miles from the lab. However, BUMC was never interested in having such an individual on the CLC. I find it hard to believe that their list of interested community members was extensive.

Specific Comments on Risk Assessment for the NEIDL

I have reviewed all the previous interations of risk assessments (RA) since 2004. Below are my comments on the +1700 page report (the "90% RA") compiled for NIH by TetraTech and Dr. Adi Gundlapalli, presented in 2012.

TetraTech does not have relevant experience

I went to Tetra Tech's website to read about their previous experience with this type of assessment of risk that a "BioSafety Lab" could pose to a community. Their "knowledge center" has no mention of any biosafety expertise (http://www.tetratech.com/us/knowledge-center/). Neither is there mention of any biosafety work in their "featured projects". Actually, a keyword search of Tetra Tech's site has "0" hits with 'biosafety' and 'BSL'. Judging from their own website, Tetra Tech's experience in biosafety lab risk assessment is 'limited', if it even exists.

Dr. Adi Gundlapalli does not have relevant experience

Dr. Gundlapalli's list of publications on PubMed shows that he has never published any peer-reviewed paper on a relevant topic. His recent publications are focused on medical communications. Based on his publication record, Dr. Gundlapalli is not someone with experience in high-containment labs or any biological research laboratory.

Dr. Gundlapalli & TetraTech have a conflict of interest in assessing the NEIDL for NIH

From Dr. Gundlapalli's biography on his University of Utah faculty site:

... is currently an investigator with the NIH-funded Rocky Mountain Center of Excellence for Biodefense and Emerging Infectious Disease Research ...

(http://medicine.utah.edu/internalmedicine/infectiousdiseases/faculty/gundlapalli.htm)

Dr. Gundlapalli is an employee of NIH who is contracted by NIH to assess if the lab that NIH has already sunk substantial money and pride into and is part of the same system research system where he is currently employed, would pose any threat to the community and should open. This is a blatant conflict of interest and cannot expect to produce an objective assessment.

This risk assessment of this NIH lab was done by contractors paid by NIH. This is reminiscent of the relationship between the ratings agencies and the investment banks that paid them for AAA ratings on junk securities, leading to the financial meltdown.

A credible risk analysis, free of conflict of interest, needs to be organized by an agency outside of NIH. I have previously suggested the General Accounting Office, which has already compiled two reports on the status of BSL-3 & 4 labs in the U.S. The GAO still remains a much better option than having NIH run a risk assessment for their own project.

Data from important & relevant accidents has been omitted from their risk assessement

Chapter 6 of their risk assessment is an important one looking at "Threat Assessment". Table 6-5 (p265) "Relationship of the Consequences of Threat Assessment Scenarios and Accident Scenarios" lists several threat scenarios that the RA contractors model and assess in this report. They also list whether there are actual, historical examples of such a scenario that can be used in their assessment. TetraTech and Dr. Adi Gundlapalli did not include the anthrax attacks from 2001 attributed to Bruce Ivins as a historical example of 'release of pathogen' in their 'malevolent acts' scenarios. This important data point was left out of their analysis.

The same is true of the 1979 release of anthrax from a government lab in Russia that killed 70+ people (a report was published in *Science* on Nov. 18, 1994). This was downplayed as 'not relevant' to the NEIDL situation. However, this was an actual event, not a hypothetical. Instead of focusing on actual events, they focus on hypotheticals. The inconvenient truths were left out of this risk assessment.

In the same table 6-5, they list "loss of pathogen" as a scenario that TetraTech and Dr. Gundlapalli will model and assess for risk. They also state there are 'no similar events' to use to model this 'loss of pathogen' scenario. They neglect to include the disappearance of 9000 vials of pathogens that were reported "unaccounted for" by Ft. Detrick in 2009.

The same table 6-5 states that more information is available about their selection of "threats" and relevant accidents in Section G.10.2.2. However, this section does not exist in the document.

TetraTech and Dr. Gundlapalli provide no discussion about how the lab-borne tularemia infections came about at BUMC in 2004-2005. In light of the subsequent lab-borne infection of Neisseria meningitidis at BUMC in 2009, it is critical to understand how these infections happened at BUMC. **This is exactly an incident that TetraTech and Dr. Gundlapalli were charged with modeling in the very institution that is the subject to RA. This was deemed irrelevant and left out of their RA.**

These are such glaring omissions in the analysis and should cause concern in any objective reviewer, in particular scientists looking to understand how these accidents happened and what the likelihood is of a repeat, or worse, with a more deadly pathogen.

TetraTech & Dr. Gundlapalli did not investigate how proliferation of easily transportable 'virus bomb parts' poses a risk to biosecurity.

State of the art research on most viral pathogens (Ebola, Marburg, 1981 influenza, SARS) involves taking the viral genome apart and putting the separate pieces onto plasmids for easier manipulation for the researchers. This also means that these 'parts of a virus bomb' can be used (and are normally made) in BSL-1, labs with much lower security. These 'virus bomb parts' look like a tiny drop of water and can be spotted onto any piece of paper, carried out of the lab, mailed anywhere in the world and then used to rebuild the 'virus bomb' with materials and know-how available in any biological research lab. This would be the **democratization of bioterrorism** capabilities, from nationally funded labs for a wider public. Think about someone having the ability of dispensing SARS or influenza from a spray bottle concealed in a backpack on a subway. As the recent shooter in France and the 2001 anthrax attacks showed, you just need to kill a few people to sow terror and shut down society.

As an experienced, professional scientist, I am very familiar with the scientific process of posing a specific question and completing a set of experiments or analysis to arrive at the objective answer. The Risk Assessment presented by TetraTech and Dr. Gundlapalli has instead decided ahead of the analysis what the desired answer is and have tailored their report to arrive at the predetermined answer. This report is not science, this is sales.

Below are comments I submitted to NIH rebutting their criticism (contained in the final Risk Assessment) of my earlier comments (listed above) submitted about the 90% Risk Assessment. The numbering refers to the comment section in the final RA.
Aug. 23, 2012

33.1-33.4: NIH and TetraTech state that their faulty analysis done on threat assessments, due to their omission of historical and relevant accidents, only appears that way because their full assessment is contained in a separate and classified threat assessment document. If the public is to be able to trust the risk assessment, they need to see it. In light of the poor record that NIH has had on developing risk assessments for the NEIDL, people are not willing to blindly trust BU and NIH. This is a truly Orwellian process where only BU and NIH are allowed to see the risk assessment that they were instructed to prepare for public comment and evaluation.

However, even without showing us their complete threat assessment, they did show us the basis for their assessment. They state that there are no previous incidents of pathogens disappearing from BSL-3 & 4 labs to use in their models. This is an admission of omission of readily available data needed for an accurate model. Therefore my concern expressed in my earlier comments remains valid and unanswered.

Based on all previous discussions and public comments from NIH and Drs. Jack Murphy and Mark Klempner representing BUMC, we can assume that their plan to prevent biocrimes in their proposed BSL-4 laboratory is with a "buddy system," where one laboratory worker will always be looking over the shoulder of another. This so-called buddy system fails to take into account the fact that laboratory scientists are normally extremely busy and highly motivated to complete their own experiments. They are usually reluctant to waste valuable research time in any distracting activity, let alone observing another worker while pipetting their reactions together. Fortunately, there is a model to test the anticipated compliance with this procedure. Since lab scientists are required to have their notebooks counter-signed by colleagues who "have read and understood" the contents and subject of those experiments, they could be surveyed for their level of compliance with these existing requirements.

Even more pertinent is the difficulty of observation. Samples in a biological laboratory are contained in a variety of indistinguishable test tubes that require the researcher to write his or her own labels in order to identify the samples contained within. Due to the irregular writing surface of the tubes, as well as varying penmanship, this system of labeling is normally impossible to decipher by anyone but the owner of the tube.

What makes mutual surveillance even more difficult is that almost all the reagents used, including stocks of virus, tubes of DNA or protein, and so forth, have the same physical appearance. There is no way to tell by looking at a tube what is inside.

Such would also be the difficulty confronting any institutional biosafety officer. Without running a battery of complex tests on every sample-—which would be too time-consuming and expensive -—the officer would have no idea of the contents of a test tube in a laboratory.

33.6 & 33.7: BU (John Tonkiss, Ass. Dir. Of Biocontainment) and BPHC officials (Dir. Barbara Ferrer and Roger Schwarz) were unaware of the existence or importance of viral genomes on plasmids when I discussed this with them in public meetings in 2009.

33.5: The tularemia outbreak from the BUMC labs was mentioned but there was no discussion or analysis about how such a strain mix up could happen. This analysis is sorely lacking, since this risk assessment would like to justify that BUMC be allowed expand its stockpile of dangerous pathogens.

33.8: There was no mention of any experience with biocontainment risk assessement on TetraTech's corporate website. They did, however, list dozens of other core competencies and projects. It seems they rank their biocontainment work a low priority. If TetraTech has completed similar analyses for other biocontainment laboratories looking to expand their stocks of dangerous pathogens, then it would be useful to know the results of those earlier analyses. Was TetraTech ever able to identify a scenario in any of these labs that they then ranked as "highly risky"? This would give us confidence that TetraTech has a functioning assessment capability. The converse could be that TetraTech is known to provide their customers, the owners of the biocontainment laboratories, with the risk assessments that ensure the opening of their labs. This would be reminiscent of the securities rating agencies getting paid to give fraudulent AAA ratings to their customers' products. This is an obvious conflict of interest.

33.9: Dr. Gundlapalli' publication record highlights a career looking at issues of communication of medical information. There is scant evidence of much hands-on experience in a biological research lab. There is also no evidence of experience with modern molecular biological techniques. There is certainly no evidence of him working in a BSL-3 or 4 lab.

33.10: From NIH's own conflicted comment, *"Dr. Gundlapalli is not an NIH employee.* ***He is currently a faculty member at the University of Utah****, School of Medicine, one of ten institutions that comprise* ***the NIH-funded*** *Rocky Mountain Regional Center of Excellence."*

Therefore, Dr. Gundlapalli gets funding from NIH and is also assessing risk posed by a lab that NIH wants to see opened. My earlier question about conflict of interest remains valid and unanswered.

United States Government Accountability Office

GAO

Testimony

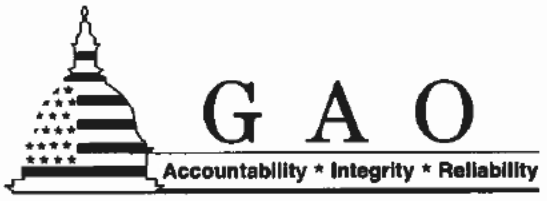
Before the Subcommittee on Oversight and Investigations, Committee on Energy and Commerce, House of Representatives

For Release on Delivery
Expected at 10:00 a.m. EDT
Thursday, October 4, 2007

HIGH-CONTAINMENT BIOSAFETY LABORATORIES

Preliminary Observations on the Oversight of the Proliferation of BSL-3 and BSL-4 Laboratories in the United States

Statement of Keith Rhodes, Chief Technologist
Center for Technology and Engineering
Applied Research and Methods



October 4, 2007

HIGH-CONTAINMENT BIOSAFETY LABORATORIES

Preliminary Observations on the Oversight of the Proliferation of BSL-3 and BSL-4 Laboratories in the United States

GAO Accountability · Integrity · Reliability

Highlights

Highlights of GAO-08-108T, a testimony before the Subcommittee on Oversight and Investigation, Committee on Energy and Commerce, House of Representatives

Why GAO Did This Study

In response to the global spread of emerging infectious diseases and the threat of bioterrorism, high-containment biosafety laboratories (BSL)–specifically biosafety level (BSL)-3 and BSL-4–have been proliferating in the United States. These labs—classified by the type of agents used and the risk posed to personnel, the environment, and the community—often contain the most dangerous infectious disease agents, such as Ebola, smallpox, and avian influenza. This testimony addresses (1) the extent to which there has been a proliferation of BSL-3 and BSL-4 labs, (2) federal agencies' responsibility for tracking this proliferation and determining the associated risks, and (3) the lessons that can be learned from recent incidents at three high-containment biosafety labs. To address these objectives, GAO asked 12 federal agencies involved with high-containment labs about their missions and whether they tracked the number of labs overall. GAO also reviewed documents from these agencies, such as pertinent legislation, regulation, and guidance. Finally, GAO interviewed academic experts in microbiological research.

To view the full product, including the scope and methodology, click on GAO-08-108T. For more information, contact Keith Rhodes at (202) 512-6412 or rhodesk@gao.gov.

What GAO Found

A major proliferation of high-containment BSL-3 and BSL-4 labs is taking place in the United States, according to the literature, federal agency officials, and experts. The expansion is taking place across many sectors—federal, academic, state, and private—and all over the United States. Concerning BSL-4 labs, which handle the most dangerous agents, the number of these labs has increased from 5—before the terrorist attacks of 2001—to 15, including at least 1 in planning stage. Information on expansion is available about high-containment labs that are registered with the Centers for Disease Control and Prevention (CDC) and the U.S. Department of Agriculture's (USDA) Select Agent Program, and that are federally funded. However, much less is known about the expansion of labs outside the Select Agent Program, as well as the nonfederally funded labs, including location, activities, and ownership.

No single federal agency, according to 12 agencies' responses to our survey, has the mission to track the overall number of BSL-3 and BSL-4 labs in the United States. Though several agencies have a need to know, no one agency knows the number and location of these labs in the United States. Consequently, no agency is responsible for determining the risks associated with the proliferation of these labs.

We identified six lessons from three recent incidents: failure to report to CDC exposures to select agents by Texas A&M University (TAMU); power outage at the CDC's new BSL-4 lab in Atlanta, Georgia; and release of foot-and-mouth disease virus at Pirbright in the United Kingdom. These lessons highlight the importance of (1) identifying and overcoming barriers to reporting in order to enhance biosafety through shared learning from mistakes and to assure the public that accidents are examined and contained; (2) training lab staff in general biosafety, as well as in specific agents being used in the labs to ensure maximum protection; (3) developing mechanisms for informing medical providers about all the agents that lab staff work with to ensure quick diagnosis and effective treatment; (4) addressing confusion over the definition of exposure to aid in the consistency of reporting; (5) ensuring that BSL-4 labs' safety and security measures are commensurate with the level of risk these labs present; and (6) maintenance of high-containment labs to ensure integrity of physical infrastructure over time.

Summary of Known BSL-4 Labs in the United States by Sector

Sector	Before 1990	1990-2000	2001-Present	Total
Federal government	2	1	6	9
Academic	0	1	3	4
State	0	0	1	1
Private	0	1	0	1
Total	**2**	**3**	**10**	**15**

Source: GAO analysis based on open source information.

Mr. Chairman and Members of the Subcommittee:

We are pleased to be here today to discuss our preliminary findings on the oversight of the expansion of high-containment biosafety level (BSL)-3 and BSL-4 laboratories (labs) in the United States. This expansion is, in part, a response to the global spread of emerging infectious diseases and the threat of bioterrorism.

BSL-3 and BSL-4 labs often contain the most dangerous infectious disease agents (for example, Ebola, smallpox, avian influenza, and severe acute respiratory syndrome [SARS]), including those for which effective vaccines or treatment may not be available. Although high-containment labs are designed to promote the safety of researchers and the public, accidents and security breaches have occurred in the past. In addition, these labs can be used by terrorists or people with malicious intent to acquire or develop harmful biological agents,[1] posing a severe national security and public health threat.

The intentional dissemination of an agent—anthrax—in the U.S. mail demonstrated the devastating effect such agents can have in the wrong hands. As a result of exposure to anthrax-tainted mail in the fall of 2001, 22 individuals contracted anthrax disease in four states—Connecticut, Florida, New Jersey, and New York—as well as in Washington, D.C. Of these 22 individuals, 5 died.

These anthrax incidents highlighted major gaps in our civilian capacity to respond to a biological attack; most noted among them, according to the National Institute of Allergy and Infectious Diseases (NIAID), was the shortage of high-containment lab capacity available to conduct research leading to the development of medical countermeasures.[2] To address this concern, the Administration and Congress responded by providing

[1]Biological agent means any microorganism (including, but not limited to, bacteria, viruses, fungi, rickettsiae, or protozoa) or infectious substance or any naturally occurring, bioengineered, or synthesized component of any such microorganism or infectious substance, capable of causing death, disease, or other biological malfunction in a human, an animal, a plant, or another living organism; deterioration of food, water, equipment, supplies, or material of any kind; or deleterious alteration of the environment.

[2]National Institute of Allergy and Infectious Diseases, *Survey for Determining the Location, Capacity, and Status of Existing and Operating BSL-3 Laboratories within the United States* (Washington, D.C., June 2, 2005).

increased funding for biodefense research and for additional BSL-3 and BSL-4 labs in the private sector, especially in university settings.

However, concerns have been raised about the oversight of these labs because the deliberate or accidental release of biological agents can have disastrous consequences, such as exposing workers and the public. In addition, as the number of BSL-3 and BSL-4 labs has been increasing, concerns have also been raised about their safety, as well as operations. Finally, there are security concerns about the potential theft of the material itself. Accordingly, you asked us to address the following three questions:

1. To what extent, and in what areas, has there been an expansion in the number of high-containment labs in the United States?
2. Which federal agency is responsible for tracking the expansion of high-containment labs and determining the associated aggregate risks?
3. What lessons can be learned from recent incidents at three high-containment labs?

To answer these questions, we interviewed officials from several federal agencies, as well as experts; reviewed literature; conducted site visits; and surveyed 12 federal agencies. We conducted our work from August 2006 through September 2007 in accordance with generally accepted government auditing standards (see appendix I for our scope and methodology).

Background

Since September 11, 2001, there has been an increase in the funding for research in biomedicine. This increase is intended to develop effective medical countermeasures, against emerging infectious diseases and biological agents, which can only be performed safely in BSL-3 and BSL-4 labs. A large part of this funding has been used to construct additional high-containment BSL-3 and BSL-4 labs.

BSL-3 and BSL-4 Labs

The BSL labs are classified by the type of agents used and the risk posed to personnel, the environment, and the community by those agents. The Department of Health and Human Services's (HHS) Biosafety in Microbiological and Biomedical Laboratories (BMBL) guidelines specify four biosafety levels, with BSL-4 being the highest. The levels include combinations of laboratory practices and techniques, safety equipment, and facilities that are recommended for labs that conduct research on potentially dangerous agents and toxins. These labs are to be designed,

constructed, and operated in a manner to (1) prevent accidental release of infectious or hazardous agents within the laboratory and (2) protect lab workers and the environment external to the lab, including the community, from exposure to the agents.

Work in BSL-3 labs involves agents that may cause serious and potentially lethal infection. In some cases, there are vaccines or effective treatments available. Types of agents that are typically handled in BSL-3 labs include, for example, anthrax, West Nile Virus, Q fever, tularemia, and avian flu. Work in BSL-4 labs involves the most dangerous agents for which there are no effective vaccines or treatments available. Types of agents that are typically handled in BSL-4 labs include, for example, Ebola, hemorrhagic fevers, and smallpox.

Federal Agencies and BSL-3 and BSL-4 Labs

Many different federal agencies have some connection with BSL-3 and BSL-4 labs in the United States. These agencies are involved with these labs in various capacities, including as users, owners, regulators, and funding sources. For example, the Centers for Disease Control and Prevention (CDC) has its own high-containment labs and regulates that portion of labs working with select agents and toxins that represent a risk to human health and safety. Similarly, the U.S. Department of Agriculture (USDA) has its own labs and regulates labs working with select agents and toxins posing a risk to animal and plant health. The NIAID has its own labs and is a major funding source for construction and research involving high-containment labs. The National Institutes of Health (NIH) both funds research requiring high containment and provides guidance that is widely used to govern many of the activities in high-containment labs. The Food and Drug Administration (FDA) has its own labs and regulates manufacturing of biological products, some of which require high-containment labs. The Department of Commerce (DOC) regulates the export of agents and equipment that have both military and civilian uses, which are often found in high-containment labs. The Department of Defense (DOD) has its own labs and funds research requiring high-containment labs. The Department of Labor's (DOL) Occupational Safety and Health Administration (OSHA) regulates some activities within high-containment labs, as well as general safety in most high-containment labs. The Department of State (DOS) regulates the export of agents and equipment that are specifically designed for military use from defense-related high-containment labs and maintains a listing of some high-containment labs, as part of the U.S. commitments under the Biological and Toxin Weapons Convention (BWC). The Department of Justice's (DOJ) Federal Bureau of Investigation (FBI) uses high-containment labs when their forensic work involves dangerous biological agents. The

Department of Homeland Security (DHS) has its own labs and funds a variety of research requiring high-containment labs. The Department of Energy (DOE) has several BSL-3 labs doing research to develop detection and response systems to improve preparedness for biological attack. The Department of Interior (DOI) has its own BSL-3 labs for work with infectious animal diseases. The Department of Veterans Affairs (VA) has research and clinical BSL-3 labs for its work with veterans. The Environmental Protection Agency (EPA) has its own labs and also coordinates use of various academic, state, and commercial high-containment labs nationwide, as part of its emergency response mission.

Pertinent Laws and Guidance

The pertinent laws and guidance include the following (see appendix II for pertinent regulations):

Pertinent Laws

The Antiterrorism and Effective Death Penalty Act of 1996 includes provisions to regulate the transfer, between laboratories, of certain biological agents and toxins and requires the Secretary of HHS to implement these provisions. As part of the implementation of this act, the first list of regulated biological agents was created. This became known as the select agent list.

The Public Health Security and Bioterrorism Preparedness and Response Act of 2002 revised and expanded the Select Agent Program. Among other requirements, the new law (1) revised the list of agents deemed "select agents," which possess the "potential to pose a severe threat" to public health and safety, to animal or plant health, or to animal or plant products; (2) directed the Secretaries of HHS and Agriculture to biennially review and publish the select agent list, making revisions as appropriate to protect the public; (3) required all facilities possessing select agents to register with the Secretary of HHS, Agriculture, or both, not just those facilities sending or receiving select agents; (4) restricted access to biological agents and toxins by persons who do not have a legitimate need and who are considered a risk by federal law enforcement and intelligence officials; (5) required transfer registrations to include information regarding the characterization of agents and toxins to facilitate their identification, including their source; (6) required the creation of a national database with information on all facilities and persons possessing, using, or transferring select agents; and (7) required the Secretaries of HHS and Agriculture to impose more detailed and different levels of security for different select agents, based on their assessed level of threat to the public.

Pertinent Guidance

Pertinent guidance includes NIH and CDC BMBL guidance, as well as NIH guidelines.

NIH and CDC BMBL Guidance

The NIH and CDC prepared the BMBL as a guidance document for working with particular select agents. According to the BMBL guidelines, (1) BSL-1 laboratories house agents and toxins that do not consistently cause disease in healthy adult humans; (2) BSL-2 laboratories are capable of housing agents and toxins that are spread through puncture, absorption through mucous membranes, or ingestion of infectious materials; (3) BSL-3 laboratories are capable of housing agents and toxins that have a potential for aerosol transmission and that may cause serious and potentially lethal infection; (4) BSL-4 laboratories are capable of housing agents and toxins that pose a high individual risk of life-threatening disease, which may be aerosol transmitted and for which there is no available vaccine or therapy.

The BMBL states that (1) biosafety procedures must be incorporated into the laboratory's standard operating procedures or biosafety manual; (2) personnel must be advised of special hazards and are required to read and follow instructions on practices and procedures; and (3) personnel must receive training on the potential hazards associated with the work involved and the necessary precautions to prevent exposure. Further, the BMBL contains guidelines for laboratory security and emergency response, such as controlling access to areas where select agents are used or stored. The BMBL also states that a plan must be in place for informing police, fire, and other emergency responders as to the type of biological materials in use in the laboratory areas.

NIH Guidelines for Research Involving Recombinant DNA Molecules

Much of the work in BSL-3 and BSL-4 labs in the United States involves recombinant DNA (rDNA), and the NIH Guidelines for Research Involving Recombinant DNA Molecules (NIH rDNA Guidelines) set the standards and procedures for research involving rDNA. Institutions must follow these guidelines when they receive NIH funding for this type of research. The guidelines include the requirement to establish an institutional biosafety committee (IBC). The IBC is responsible for (1) reviewing rDNA research conducted at or sponsored by the institution for compliance with the NIH rDNA Guidelines and (2) approving those research projects that are found to conform with the NIH rDNA Guidelines. IBCs also

periodically review ongoing rDNA research to ensure continued compliance with the NIH rDNA Guidelines.

The Select Agent Program

The CDC is responsible for the registration and oversight of laboratories that possess, use, or transfer select agents and toxins that could pose a threat to human health. USDA is responsible for the registration and oversight of laboratories that possess, use, or transfer select agents and toxins that could pose a threat to animal or plant health or animal or plant products. Some select agents, such as anthrax, pose a threat to both human and animal health and are regulated by both agencies (see appendix III for the list of select agents and toxins).

The select agent regulations require registration for U.S.-based research institutions, government agencies, universities, manufacturers, and other entities that possess, use, or transfer select agents. Registration is for 3 years. As part of the registration process, facilities must demonstrate in their applications that they meet the recommendations delineated in the BMBL for working with particular select agents. Such requirements include having proper laboratory and personal protective equipment, precautionary signage, and ventilation; controlled access; and biosafety operations manuals. Facilities must also describe the laboratory procedures that will be used, provide a laboratory floor plan showing where the select agent will be handled and stored, and describe how access will be limited to authorized personnel.

In addition, facilities must describe the objectives of the work that requires the select agent. Each facility must identify a responsible facility official who is authorized to transfer and receive select agents on behalf of the facility. Individuals making false, fictitious, or fraudulent statements on registration forms may be punished, under the False Statements Act, by a fine of up to $250,000, imprisonment up to 5 years, or both. Violations by organizations are punishable by a fine of up to $500,000 per violation. To ensure compliance with these requirements, the program established a goal of inspecting these facilities once during the 3-year registration period. Facilities may be inspected before and after registration, but there is no requirement that inspections be performed.

Results in Brief

A major expansion of high-containment biosafety labs (BSL-3 and BSL-4) is taking place in the United States, according to the literature, federal agency officials, and experts. Concerning BSL-4 labs, which handle the most dangerous agents, the number of these labs has increased from 5—before the terrorist attacks of 2001—to 15, including at least 1 in the

planning stage. The expansion is taking place across many sectors—federal, state, academic, and private[3]—and across most of the United States. Information on expansion is available about high-containment labs that are (1) registered with the CDC-USDA Select Agent Program and (2) federally funded. However, much less is known about the expansion of labs outside the Select Agent Program as well as the nonfederally funded labs, including location, activities, and ownership.

No single federal agency has the mission and, therefore, is accountable for tracking the number of all BSL-3 and BSL-4 labs within the United States. Moreover, although several agencies have a need to know the number and location of these labs to support their missions, no agency knows how many such labs there are in the United States or their locations, according to agencies' responses to our survey. Therefore, no agency is responsible for determining the aggregate risks associated with the expansion of these labs. According to the experts, there is a baseline risk associated with any high-containment lab, attributable to human errors. With this expansion, the risk will increase. However, the associated safety and security risks will be greater for new labs with less experience.

We identified six lessons from three recent incidents: failure to report to CDC exposures to select agents by Texas A&M University (TAMU); power outage at CDC's new BSL-4 lab in Atlanta, Georgia; and a release of foot-and-mouth disease virus at Pirbright in the United Kingdom (U.K.). These lessons highlight the importance of (1) identifying and overcoming barriers to reporting in order to enhance biosafety through shared learning from mistakes and to assure the public that accidents are examined and contained; (2) training lab staff in general biosafety, as well as in specific agents being used in the labs to ensure maximum protection; (3) developing mechanisms for informing medical providers about all the agents that lab staff work with to ensure quick diagnosis and effective treatment; (4) addressing confusion over the definition of exposure to aid in the consistency of reporting; (5) ensuring that BSL-4 labs' safety and security measures are commensurate with the level of risk these labs present; and (6) maintenance of high-containment labs to ensure integrity of physical infrastructure over time.

[3]Private sector labs include commercial labs.

Expansion of BSL-3 and BSL-4 Labs Is Taking Place across Many Sectors and All over the United States

An expansion in the number of BSL-3 and BSL-4 labs is taking place across most of the United States,[4] according to the literature, federal agency officials, and experts. Most federal officials and experts believe that the number of BSL-4 labs in the United States is generally known. But the number of BSL-3 labs is unknown. Information on expansion is available about high-containment labs that are (1) registered with the CDC-USDA's Select Agent Program, and (2) federally funded. However, much less is known about the expansion of labs outside the Select Agent Program and the nonfederally funded labs, including location, activities, and ownership. For both BLS-3 and BSL-4, the expansion is taking place across many sectors—federal, state, academic, and private—and all over the United States.

An Expansion of BSL-3 and BSL-4 Labs Is Taking Place in All Sectors in the United States

For most of the last 50 years, there were only two sites with BSL-4 labs in the United States. These were federal labs at the U.S. Army's Research Institute for Infectious Diseases (USAMRIID) in Fort Detrick, Maryland, and at the CDC in Atlanta, Georgia. Between 1990 and 2000, three new BSL-4 labs were built: a BSL-4 lab at Georgia State University in Atlanta—the first BSL-4 lab in a university setting; a small BSL-4 lab on the NIH campus in Bethesda, Maryland;[5] and a privately funded BSL-4 lab in San Antonio, Texas. Since the terror attacks of 2001, nine new facilities and one major remodeling effort containing BSL-4 space will either be operational, in construction, or in planning by this year's end. The number of BSL-4 laboratories has increased from 5, before 2001, to 15, including at least 1 in planning.

Moreover, expansion is taking place across all sectors. Before 1990, all BSL-4 labs were federal labs—either at USAMRIID or at the CDC. Today, while expansion is taking place within the federal sector as well—there

[4]There are a number of methodological issues associated with determining the overall number of BSL-3 and BSL-4 labs. In our discussion with federal agency officials, experts, and review of the literature, we found that the total number depended upon how you ask the question. Most often data were available on the number of facilities or sites that contained a BSL-3 or BSL-4 lab. The precise number of independent rooms within those facilities qualifying as BSL-3 or BSL-4 is not generally specified. Some facilities contain more than one actual lab. For example, while CDC has two facilities with BSL-4 capacity, one of the facilities actually contains within it two separate BSL-4 labs, while the other has four separate BSL-4 labs. These officials and experts also told us that counting the number of labs is problematic because the definition of the term "lab" varies. A more meaningful measure is determining the net square footage of working BSL-4 space. However, this information is often not available.

[5]This is lab was built as a BSL-4 but currently operates as an enhanced BSL-3.

are seven new federal facilities recently built, currently under construction, or planned, which have one or more BSL-4 labs—there are also BSL-4 labs at universities, as part of state response, and in the private sector. (See table 1 for expansion in BSL-4 labs by sector.)

Table 1: Summary of Known BSL-4 Labs in the United States, by Sector

Sector	Before 1990	1990-2000	2001-Present	Total
Federal government	2	1	6	**9**
Academic	0	1	3	**4**
State	0	0	1	**1**
Private	0	1	0	**1**
Total	**2**	**3**	**10**	**15**

Source: GAO analysis based on open source information.

Note: These numbers represent the lower bound of the number of BSL-4 labs. Within each of these facilities, there may be several independent rooms designated as work areas, each at BSL-4 level.

While the number is difficult to quantify, many more BSL-3 labs are thought to exist compared with BSL-4 labs. Many lab owners—when building new labs or upgrading existing ones—are building to meet BSL-3 level containment, often anticipating future work, even though they intend for some time to operate at the BSL-2 level with BSL-2 recommended agents. In addition, much biodefense work, for example, involves aerosolization of agents for challenge studies, and most of this type of activity is often recommended for containment at the BSL-3 level.

The expansion of BSL-3 labs is in all sectors. However, the only definitive data available are on labs registered with the CDC-USDA Select Agent Program. Within that program, two-thirds of registered BSL-3 labs are outside the federal sector (see table 2).

Table 2: BSL-3 Labs Registered with the CDC and USDA Select Agent Program, by Sector

Sector	CDC-registered labs	USDA- registered labs	Total
	Number	Number	Number
Federal	291	167	458
Academic	429	58	487
State	248	20	268
Private	74	69	143
Total	**1042**	**314**	**1356**

Source: GAO's analysis of CDC-USDA data.

Within the academic sector, for example, NIAID has provided funding for 13 Regional Biocontainment Laboratories (RBL) to provide regional BSL-3 capability for academic research requiring such containment. Expansion at the state level is also taking place (see table 3). According to a survey conducted by the Association of Public Health Laboratories (APHL) in the fall of 2004, since 2001 state public health labs have used public health preparedness funding to build, expand, and enhance BSL-3 labs.[6] In 1998, for example, APHL found that 12 of 38 responding states reported having a state public health laboratory at the BSL-3 level. Today, at least 46 states have at least one state public health BSL-3 lab.

Table 3: BSL-3 Labs in the State Public Health System

Calendar year	State public health BSL-3 labs
2001	69
2002	71
2003	139

Source: Association of Public Health Laboratories, 2005.

The Expansion of BSL-3 and BSL-4 Labs Is Taking Place Generally across the United States

Expansion of BSL-3 and BSL-4 labs is starting to take place geographically as well as by sector. For example, before 1990, BSL-4 labs were clustered at either USAMRIID at Fort Detrick or at CDC. Today, there are BSL-4 labs built, under construction, or in planning in four states other than Maryland and Georgia.

[6]Association of Public Health Laboratories, *Public Health Laboratory Issues in Brief: Bioterrorisn Capacity* (Washington D.C., April 2005).

The expansion of BSL-3 labs is widespread across most states. Because of the need for individual state response to bioterrorist threats, most states now have some level of BSL-3 capacity—at least for diagnostic and analytical services—in support of emergency response. In addition, within the academic research community, the RBLs being constructed by the NIAID are intended to provide regional BSL-3 laboratory capacity to support NIAID's Regional Centers of Excellence for Biodefense and Emerging Infectious Diseases Research (RCE). Hence, the RBLs are distributed regionally around the country. Operational, under construction, or currently planned BSL-4 labs and some of the major BSL-3 facilities in the United States are shown in figure 1.